

**Patent Claims**

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1. A computer for analyzing data from nuclear magnetic resonance, whereby the data contains at least one relaxation signal of a sample, characterized in that the computer operates with at least one analyzing means that separates the data into at least two parts that are differently dependent on an echo time  $T_E$ .
2. The computer according to Claim 1, characterized in that the analyzing means separates the data into at least one part that is dependent on an echo time  $T_E$  and into at least one more component that is not dependent on the echo time  $T_E$  and whereby the analyzing means acquires the signals that are dependent on an echo time  $T_E$  as activation signals.
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3. A nuclear magnetic resonance tomograph characterized in that it comprises at least one computer according to one of Claims 1 or 2.
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4. A method to analyze data from nuclear magnetic resonance, whereby at least one relaxation signal of a sample is detected, characterized in that the data is separated into at least two parts having a different dependence on an echo time  $T_E$ .
5. The method according to Claim 4, characterized in that the intensity values of the measured data are acquired and separated into at least two different dependencies on the echo time  $T_E$ .
6. The method according to Claim 5, characterized in that a measure of a statistical variation of the intensities is determined.
7. The method according to Claim 6, characterized in that a standard deviation of the intensities is ascertained.

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8. The method according to one of Claims 4 through 7, characterized in that the relaxation signal is divided into at least one part that is dependent on the echo time  $T_E$  and into at least one part that is not dependent on the echo time  $T_E$ .

9. The method according to one of Claims 4 through 8, characterized in that at least one signal is determined that is proportional to  $T_E \exp(-T_E / T_2^*)$ .

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10. The method according to Claim 9, characterized in that  $T_2^*$  is ascertained with the formula  $S = S_0 \exp(-T_E / T_2^*) + g$ .

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11. The method according to one or more of Claims 4 through 10, characterized in that statistical fluctuations of  $\Delta T_2^*$  are ascertained.

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12. The method according to Claim 11, characterized in that a standard deviation  $\sigma(\Delta T_2^*)$  is ascertained.

13. The method according to Claim 12, characterized in that a quotient  $\sigma(\Delta T_2^*) / T_2^*$  is formed and acquired as a measure of an activity.

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14. The method according to one of Claims 4 through 13, characterized in that a statistical deviation of an initial intensity  $S_0$  is ascertained.

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15. The method according to Claim 14, characterized in that a standard deviation  $\sigma(\Delta S_0)$  is ascertained.

16. The method according to Claim 15, characterized in that a quotient  $\sigma(\Delta S_0) / \Delta S_0$  is ascertained.

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A5 17. The method according to one of Claims 4 through 16, characterized in that a statistical fluctuation of a noise signal  $g$  is ascertained.

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B2 18. The method according to Claim 17, characterized in that a standard deviation  $\sigma(g)$  of  $g$  is formed.

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AG 19. The method according to one of Claims 4 through 18, characterized in that the recorded data is acquired in an at least two-dimensional field, whereby a field axis (DTE) acquires echo times  $T_E$  and whereby another field axis (DTR) reproduces repetitions of excitations at a time interval  $T_R$ .

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B2 20. The method according to Claim 19, characterized in that  $\sigma(\Delta T_2^*)$  and  $\sigma(g)$  are determined by means of the following steps:

- (i) adaptation of signals averaged over DTR to an exponential decay as a function of DTE and determination of  $S_0$  and  $T_2^*$ ;
- (ii) calculation of  $\sigma(\Delta S_0)$ ,  $\sigma(\Delta T_2^*)$  and  $\sigma(g)$  for several voxels and different  $T_E$ , followed by averaging of these values over at least one region of interest (ROI);
- (iii) adaptation of

$$\frac{\sigma(\Delta S)}{S_0} = \left\{ \left[ \left( \frac{T_E}{T_2^*} \right)^2 \left( \frac{\sigma(\Delta T_2^*)}{T_2^*} \right)^2 + \left( \frac{\sigma(\Delta S_0)}{S_0} \right)^2 - 2 \frac{T_E}{T_2^*} \frac{\langle \Delta S_0 \Delta T_2^* \rangle}{S_0 T_2^*} \right] e^{-2 T_E / T_2^*} + \left( \frac{\sigma(g)}{S_0} \right)^2 \right\}^{1/2}$$

and determination of  $\sigma(\Delta S) / S_0$  as a function of  $T_E$ .

21. The method according to Claim 20, characterized in that the expression  $\langle \Delta S_0 \Delta T_2^* \rangle = 0$  is used for the adaptation of  $\sigma(\Delta S_0) / S_0$ .